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Notice of Allowability	Application No.	Applicant(s)	
	09/744,904	TAKAHASHI ET AL.	
	Examiner	Art Unit	
	Rip A. Lee	1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to April 25, 2005.
2. ☒ The allowed claim(s) is/are 1, 3-22, 24-28, and 30-43.
3. ☐ The drawings filed on _____ are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

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Allowable Subject Matter

Claims 1 and 3-12 are allowed over the closest references, U.S. Patent No. 5,747,620 to Machida *et al.*, U.S. Patent No. 6,194,341 to Canich *et al.*, U.S. Patent No. 6,153,716 to Welch *et al.*

The present invention is drawn to an ethylene homopolymer or ethylene/C₄₋₂₀ α -olefin copolymer wherein (i) the methyl branches are less than 0.1 per 1000 C atoms as measured by ¹³C NMR spectroscopy, (ii) the molecular weight distribution, M_w/M_n is 1.8 – 4.5, and (iii) the intrinsic viscosity, $[\eta]$ (135 °C, decalin) is 0.2 – 18 dL/g.

Machida *et al.* teaches ethylene/ C₃₋₂₀ α -olefin copolymers having a mole ratio of methyl groups to methylene groups [CH₃/CH₂] of 0.005 to 0.1, corresponding to 5 methyl groups per 1000 methylene groups. The molecular weight distribution, M_w/M_n , of copolymers lies in the range of 1.5 – 70, and the intrinsic viscosity, $[\eta]$ (135 °C, decalin) is 0.01 – 20 dL/g. The polymer does not have the requisite branching number of less than 0.1 per 1000 C atoms.

Canich *et al.* discloses an ethylene polymer with a molecular weight distribution, M_w/M_n , of 2.4 with no short chain branching as detected by ¹³C NMR spectroscopy. No information is provided regarding the intrinsic viscosity of the polymer, and since there is no supporting information in the text, one having ordinary skill in the art would not have found it obvious to believe that the prior art material would exhibit the claimed rheological property.

Welch *et al.* teaches ethylene/butene copolymers having a molecular weight distribution, M_w/M_n , of about 2 to 2.5 and having no detectable amounts of branches other than ethyl branches, as determined by ¹³C NMR spectroscopy. No information is provided regarding the intrinsic viscosity of the polymer, and since there is no supporting information in the text, one having ordinary skill in the art would not have found it obvious to believe that the prior art material would exhibit the claimed rheological property.

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Claims 13-22 and 24-28 are allowed over the closest reference, U.S. Patent No. 5,798,305 to Horiuchi. Claim 13 is drawn to an ethylene homopolymer or a copolymer of ethylene and a C₄₋₂₀ α -olefin containing less than 0.1 methyl branches per 1000 carbon atoms and a polydispersity, M_w/M_n , of 5.5-50. Horiuchi teaches a polyethylene polymer having 0-1.5 methyl branches per 1000 carbon atoms and M_w/M_n of 4.5 or less. The molecular weight distribution of polymers of the prior art lies outside the claimed range.

Claims 30-33 are allowed over the closest reference, U.S. Patent No. 5,260,384 to Morimoto *et al.* Claim 30 is drawn to an ethylene (co)polymer having (i) a melt tension and swell ratio defined by the inequality $\log(\text{MT}) > 12.9 - 7.15\text{SR}$, (ii) a relationship between intrinsic viscosity $[\eta]$ and melt flow rate defined as:

$$[\eta] > 1.85 \text{ MFR}^{-0.192} \text{ when MFR} < 1$$

$$[\eta] > 1.85 \text{ MFR}^{-0.213} \text{ when MFR} \geq 1$$

and (iii) a relationship between weight average molecular weight and swell ratio expressed as $\text{SR} > 4.55 - 0.56\log(M_w)$. Morimoto *et al.* discloses a polyethylene which displays a melt tension of 70, a swell ratio of 1.9, an intrinsic viscosity of 4.71 and MFR of 2.9. Both conditions (i) and (ii) are satisfied, however, the patent does not teach the relationship between M_w and swell ratio.

Claims 34-38 are allowed over the closest reference, U.S. Patents No. 5,731,393 to Kojoh *et al.* and 6,294,631 to Brant, and JP 8-302083. Claim 34 is drawn to an ethylene homopolymer or a copolymer of ethylene and a C₃₋₂₀ α -olefin having a molecular weight distribution greater than 9.2 and the ratio M_z/M_w defined by the expression, $M_z/M_w \geq 4 / (0.5 - 4.50 / ((M_w/M_n) - 0.2))$. None of the polymers in the cited patents meets the claimed limitation of M_z/M_w .

Claims 39-43 are allowed over references cited to date. The claims are drawn to an ethylene homopolymer or a copolymer of ethylene and a C₃₋₂₀ α -olefin having at least two maxima and at least one minimum in the GPC molecular weight distribution curve in which the intensity of the minimum value, W_1 , and the lower intensity of the maxima, W_2 , satisfy the inequality $W_1/W_2 < 0.85$. The subject matter of these claims is not taught or fairly suggested in the prior art.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached at (571)272-1114. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).



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May 10, 2005



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